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LIEBIG.

Justus von Liebig: his Life and Work (1809-73). By W. A. Shenstone, F.I.C. (London: Cassell and Co., Limited, 1895.)

TO those who listened—it is now twenty years ago—to the Faraday Lecture given by the late Prof. Hofmann within the walls of the Royal Institution to the Fellows of the Chemical Society of London, or to those who have since read the report of this eloquent and enthusiastic discourse in the *Transactions* of the Chemical Society, the task of preparing a new account of the life and labours of Liebig would appear to be a very difficult one.

But to say merely that Mr. Shenstone has succeeded in this difficult task, would be scarcely to do justice to his admirable little volume, which has evidently been very carefully compiled, and which, while it possesses literary charm of its own, gives a clear and, at the same time, critical summary of the work and writings of the great chemist, which makes it, for popular reading at all events, preferable to Hofmann's brilliant lecture. Mr. Shenstone is evidently a master of exposition, and if in reading through the pages of his book the scientific man encounters one or two statements or expressions of opinion with which he cannot agree, he will be ready to condone these delinquencies in view of the generally excellent style of the whole. And notwithstanding the remark in the preface, that the object has been "not so much to dwell upon Liebig's private life as to tell what he was, what he did, and why all chemists and all those who are versed in the history of science admire and esteem him so greatly," the book, as a biographical sketch, is superior to the lecture. As pointed out by the author, it is quite true, and as remarkable as it is true, that few people nowadays, even among students of chemistry, know much about Liebig's scientific work and his services to the great departments of applied chemistry in physiology, medicine, and agriculture. Liebig's extract of meat, Liebig's potash bulbs, and Liebig's condenser are the only things which a present-day student can usually recall if asked to give an account of Liebig's work, and these he seems generally to regard as trivial inventions deserving of little remark. Liebig's life, cut short, as one would say in these days of general longevity, at the early age of threescore years and ten, was full of activity. The Royal Society Catalogue of Scientific Papers gives a list of upwards of three hundred papers published by him, of which some five-and-twenty were issued under joint authorship with Wöhler, his life-long friend and associate. And the *Annalen*, which to this day are familiarly referred to as "Liebig's," contain in the first 165 volumes issued during his lifetime all the long array of memoirs which embody the results of the researches of the master and his pupils.

Up to the age of sixteen, little promise of future greatness was given by the restless boy, at once "the plague of his teachers and the sorrow of his parents," as he was told by the Rector of the Gymnasium. This period of his life, marked chiefly by conflict with his schoolmasters, reminds one of Darwin's early days at Shrewsbury. And examples of this kind, of which many are now well known, fill one with wonder that the schoolmaster does not yet recognise the need for greater elasticity in the prevalent system of education.

The ideal schoolboy is an orderly machine, always obedient, receptive, submissive, ready in the cricket-field, and with real or simulated enthusiasm for football, despising all other games, and conservative to the backbone. He is the darling of the master, who sends him home with glowing reports and arms-full of prize-books. It seems never to occur to any one that there may be natures to which the classical languages and history make no appeal, who have not the gift of the mathematician, and who do not even care to play at cricket or football. If such appear in a public school they have a bad time of it, dragging out their miserable days at the bottom of the form, regarded as fools by the masters, and as muffs by the boys. And yet among these school failures there may be Liebigs or Darwins, or at any rate there may be, and commonly there is, the material out of which good and useful citizens are made, if only they had a chance to show what they can do.

It is not surprising that Germany should cherish the memory of Liebig, for to his example and influence she undoubtedly owes the development and activity of her chemical schools; and it is interesting to note the relative progress made by the chief European nations in this direction. In Liebig's youth the supremacy of the English and French chemists was unquestioned, Berzelius alone representing the science in Sweden. It was, as Liebig himself says, "a wretched time for chemistry in Germany."

Since that day things have greatly changed, the German laboratories have outnumbered those of England and France together, and their output of scientific results has so greatly exceeded the achievements of all other European countries as to have formed a subject of not undeserved reproach to the rest of them.

At the present time, however, things are not so bad, and there is great hope, from the renewed activity of the universities and technical schools in France and in England, as well as in other parts of Europe and in America during the last few years, that these other countries will in future contribute their full share to the work of experimental investigation and the encouragement of scientific education and thought.

It would be scarcely fair to the author of this "Life" to make any attempt to epitomise it, short and compact as it is. Those who are interested must read the book, and those who read it will certainly be interested. But the estimate formed by the author of the relative value and importance of the several kinds of service rendered by Liebig to the world, seems to be scarcely in agreement with that which is more generally current among chemists and physiologists. First in importance we should place Liebig's work in the domain of organic chemistry. Having shown how to analyse carbon compounds, he led the way in their investigation, and by the introduction of the theory of compound radicles laid the whole foundation of modern organic chemistry. Scarcely second in importance was the establishment of the system of practical teaching in the laboratory at Giessen, which certainly set an example soon followed by all the universities on the

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continent, and led to the erection of laboratories in England, not in the great universities, to their shame be it said, but at such places as University College, London, and the College of Chemistry.

Liebig's researches in connection with physiology and agriculture were of the utmost importance in their day, but chiefly by reason of the stimulus afforded to inquiry; for while the whole, or nearly the whole, of his chemical work remains as firmly established as ever, the greater part of his physiological theories in relation to plant nutrition, to fermentation, and to animal physiology, have been either superseded altogether, or so modified as to be no longer recognisable.

The author will probably see fit, on further reflection, to alter some of the views expressed in his own remarks; but enough has been said to show that Mr. Shenstone has made a contribution to the "Century Series" which will, we venture to think, be by no means the least attractive and interesting of these useful little volumes.

W. A. T.

THE SELECTION OF HEALTH RESORTS.

Climates and Baths of Great Britain. Vol. i. (London: Macmillan and Co., 1895.)

THIS work is the outcome of the report of a committee appointed by the Royal Medical and Chirurgical Society of London for the purpose of investigating questions of importance with reference to the climatology and balneology of Great Britain and Ireland.

The information contained in the volume—which deals with the climate of the south of England and with the chief medicinal springs of Great Britain—may be summarised as follows:—

(1) Information received from medical practitioners in the districts dealt with.

(2) The results of personal investigations by members of the committee.

(3) The analysis of published vital statistics of the localities in question.

That the treatment of the climatology of very small areas of these islands is a difficult and complex matter, is a fact patent to every one; it is every one's experience, for instance, that one side of a bay or headland, owing to its exposure, may be tonic and bracing, whereas the other side, owing to a different aspect, or to protection by high cliffs and woodland, may be warm and relaxing. But since meteorological data are of undoubted value in determining the suitability of an area for the residence of those suffering from various diseases, it is certain that some measure of the utility of the present work should be gauged from the detail and precision of these data; and the book will be found lacking in this respect. Little blame is attachable, however, to the contributors, who have in the majority of cases made the most of their available information; the fact is, we have not yet at hand sufficient data to enable a scientific work upon the climatic conditions of all the many small areas here dealt with to be penned; the records are so few, that it is very frequently found necessary to supplement instrumental observations by personal impressions. Thus we are constantly told that one place is *probably* colder than another, that it is thought to have more mist and moisture in the atmosphere, and so on; and one so frequently encounters such remarks as "there are no climatic records, but the impression is," &c., that the conviction is more and more borne home that it would have been well if the committee had first taken some steps, through medical men and others, to secure more scientific data before publishing the present volume. With rare exceptions, precise meteorological data are confined to towns and their immediate neighbourhood; and to show the difficulty with which the committee had to contend in the case of one important county (*i.e.* Somerset), it is sufficient to state that this county possesses at the present time only one station of the Royal Meteorological Society.

Then, again, atmospheric conditions and health are so largely the outcome of geological factors, that in a few instances it is matter for regret that this subject is not treated with a little more fulness; and in such a work one would expect to find some observations upon the mean height, and the extent of variation from the mean, in the ground-water level, knowing as we do the important bearing which this has upon health and disease.

So far as the information relates to the healthiness of the various areas treated of, and their suitability for residence by patients suffering from various diseases, much will be found of real value; but here again the contributors have had to face great difficulties—difficulties which in many respects are practically insurmountable; and here again the work presents some shortcomings. In making deductions from vital statistics, it would have been better and safer to have done so from as many returns as possible, and not to have rested satisfied, as in so many instances, with the actual records of just one brief year; and it would, moreover, have been more serviceable to those who would like to make their own deductions as to the relative advantages of different areas, if instead of the actual number of deaths being given, the rates of the more important diseases had been worked out for each locality. As it is, it would be a matter of no small labour to decide which of the many areas dealt with stands best with regard to *relative* immunity from any particular disease.

In the reports of local practitioners there is occasionally some evidence of the touch of a loving hand, the attractions and healthiness of the part being enthusiastically attested to; and for this reason, again, it will be no easy matter to conclude, from a perusal of the work, as to which is the most desirable spot to select; but at least one is not likely to fix upon Dartmoor, which an informant asserts has on an average 319 wet days in the year. Most of this local information, however, is very fair and impartial, and the conscientious and judicial manner in which conclusions are drawn by the different authors from the information at their hands is a striking feature of the work.

The committee points out that in a work comprising information of many sorts and from many sources, it is inevitable that a certain amount of error must have crept in; but as a matter of fact, the reader will discover scarcely any error of commission; what blemishes the work possesses are undoubtedly on the score of omission. There is one glaring instance of contradiction which we have noticed, and which will serve to present a good example, to the lay mind, of how doctors disagree. On

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